

IN THE CLAIMS:

Please cancel claims 21 and 23. Please also amend claims 2, 4, 5, 8, 15, 18, 20, 22, and 24, as shown in the complete list of claims that is presented below.

Claim 1 (cancelled).

2. (currently amended) A watermark information embedding apparatus, comprising:

a document image generating section for generating a document image;

a PN code generating section for generating at least one PN code;

a watermark image generating section for ~~representing~~ diffusing units of watermark information using the at least one PN code, generating representational watermark information, and generating a watermark image in which the ~~representational~~ diffused units of watermark information are redundantly ~~[[is]]~~ denoted by dot patterns that are repeated at a plurality of locations; and

a synthesizing section for overlapping the document image and the watermark image so as to generate a watermarked document ~~image.~~ image.

wherein the units of watermark information are represented by bits, and

wherein the watermark image generating section diffuses each bit of watermark information by representing the respective bit by the at least one PN code if the respective bit has a first value and by representing the respective bit by a modified version of the at least one PN code if the respective bit has a second value.

3. (previously presented) The watermark information embedding apparatus according to Claim 2, wherein the watermark image generating section utilizes the at least one PN code to represent the watermark information with respect to row units or column units.

4. (currently amended) The watermark information embedding apparatus according to Claim 2, wherein the PN code generating section generates at least one two-

dimensional PN code which is different from or the same in a row direction and a column direction.

5. (currently amended) A watermark information embedding apparatus comprising:

a document image generating section for generating a multipage document image;

a PN code generating section for generating two dimensional [[PC]] PN codes that together form a three-dimensional PN code which is different ~~from~~ or the same in a row direction, a column direction, and a page direction respectively;

a watermark image generating section for diffusing units of watermark information using the two-dimensional PN codes, generating to represent units of watermark information on a sequence of representational watermark pages, and generating so as to generate a multipage watermark image in which the diffused units of watermark information are redundantly denoted by dot patterns that are repeated at a plurality of locations; and

a synthesizing section for overlapping the multipage document image and ~~corresponding~~ the multipage watermark image so as to generate a watermarked document ~~image. image,~~

wherein the units of watermark information are represented by bits, and

wherein the watermark image generating section diffuses each bit of watermark information by representing the respective bit by at least one of the two PN codes if the respective bit has a first value and by representing the respective bit by a modified version of the at least one of the two PN codes if the respective bit has a second value.

6. (previously presented) The watermark information embedding apparatus according to Claim 2, wherein there is at least one dot pattern representing special watermark information.

Claim 7 (cancelled).

8. (currently amended) A watermark information detecting apparatus for extracting units of watermark information, which ~~are represented~~ is diffused by at least one PN code ~~in a watermark image and redundantly denoted by dot patterns that are repeated at a plurality of locations in a watermark image,~~ from a document, comprising:

a watermark information detector, the watermark information detector ~~extracting~~ detecting the diffused watermark information to extract the watermark image from the document, and estimating an area occupied by the watermark information based on the watermark image and the at least one PN ~~code.~~ code.

wherein the units of watermark information are represented by bits, and
wherein each bit of watermark information is diffused by representing the
respective bit by the at least one PN code if the respective bit has a first value and by
representing the respective bit by a modified version of the at least one PN code if the
respective bit has a second value.

9. (previously presented) The watermark information detecting apparatus according to Claim 8, wherein the watermark information detector discriminates whether the watermark information is correctly detected according to at least one correlation peak value of the at least one PN code.

10. (previously presented) The watermark information detecting apparatus according to Claim 8, wherein the watermark information detector calculates correlation values using different PN codes, detects a correlation peak value of each PN code, and estimates row addresses and column addresses according to the correlation peak values.

11. (previously presented) The watermark information detecting apparatus according to Claim 8, wherein the watermark information detector calculates a correlation of two-dimensional PN codes, which include different PN codes in a row direction and a column direction, so as to estimate the area occupied by the watermark information.

12. (previously presented) The watermark information detecting apparatus according to Claim 8, wherein the document is a multipage document, and wherein the

watermark information detector calculates a correlation of three-dimensional PN codes, which include different PN codes in a row direction, a column direction, and a page direction, so as to estimate the area occupied by the watermark information.

13. (previously presented) The watermark information detecting apparatus according to Claim 8, wherein there is at least one dot pattern representing special watermark information.

Claim 14 (cancelled).

15. (currently amended) A method of embedding watermark information, comprising:

generating a watermark image, the generating step including using a watermark information embedding apparatus to ~~represent~~ diffuse units of watermark information [[by]] using at least one PN code, the diffused units of watermark information being redundantly denoted in the watermark image by dot patterns that are repeated at a plurality of locations;

combining the watermark image and a document image so as to generate a combined image; and

outputting the combined ~~image~~; image,
wherein the units of watermark information are represented by bits, and
wherein each bit of watermark information is diffused by representing the
respective bit by the at least one PN code if the respective bit has a first value and by
representing the respective bit by a modified version of the at least one PN code if the
respective bit has a second value.

16. (previously presented) The method of embedding watermark information according to Claim 15, wherein there is at least one dot pattern representing special watermark information.

Claim 17 (cancelled).

18. (currently amended) A method for detecting watermark information using a watermark information detecting apparatus to extract units of watermark ~~information,~~
information from document, the units of watermark information being which are represented
by bits and being diffused by at least one PN code in a watermark image, ~~from a document,~~
wherein each bit of watermark information is diffused by representing the respective bit by
the at least one PN code if the respective bit has a first value and by representing the
respective bit by a modified version of the at least one PN code if the respective bit has a
second value, the method comprising the steps of:

(a) extracting the watermark image, step (a) including detecting the diffused units
of watermark information;

(b) calculating at least one correlation between the watermark image and the at
least one PN code; and

(c) estimating an area occupied by the watermark information according to steps
(a) and (b).

19. (previously presented) The method of detecting watermark information
according to Claim 18, wherein there is at least one dot pattern representing special
watermark information.

20. (currently amended) A method for generating a watermarked document
comprising:

generating a watermark image, by using at least one PN code to represent units of
watermark information the generating step including diffusing units of watermark
information and redundantly denoting the diffused units of watermark information by dot
patterns that are repeated at a plurality of locations; and

combining the watermark image and a document image, image,
wherein the units of watermark information are represented by bits, and
wherein each bit of watermark information is diffused by representing the
respective bit by the at least one PN code if the respective bit has a first value and by

representing the respective bit by a modified version of the at least one PN code if the respective bit has a second value.

Claim 21 (cancelled).

22. (currently amended) The method of Claim 20, wherein the at least one PN code includes a particular PN code and ~~another~~ the modified version of the at least one PN code ~~having~~ has bits that are inverted from the bits of the particular PN code.

Claim 23 (cancelled) The watermark information embedding apparatus according to Claim 2, wherein the units of watermark information are bits of watermark information.

24. (currently amended) The watermark information embedding apparatus of Claim 2, wherein the at least one PN code includes a particular PN code and ~~another~~ the modified version of the le least one PN code ~~having~~ has bits that are inverted from the bits of the PN code.